The "Eurydice" Squall

THE loss of H.M.S. *Eurydice* on the 24th ult. may perhaps give a melancholy interest to a plain statement of the facts connected with the meteorology of that day.

The squall in which she capsized was one of a common class which occur when, after a long steady fall of the barometer, the mercury pauses for a few hours before commencing to rise. These squalls differ considerably from simple squalls, and are frequently complicated, as in this case, with small secondary cyclones.

Since the 20th inst. the general type of weather over our islands had been very uniform, an area of high pressure being constantly found over the west of Ireland, with a constantly low pressure near Stockholm giving cold north-west winds, conditions which are very common in the month of March. But while the general shape of the isobaric lines remained constant, the absolute pressure over the whole area had been diminishing rapidly till the 24th inst. On the morning of that day, the centre of a cyclone was near Stockholm, while no less than three secondary depressions were influencing Great Britain, and by 6 P.M. the whole system had gathered itself into two small cyclones whose centres were near Yarmouth and Bergen.

Such a development of secondaries with a north-west wind is not common, and is always associated with exceptionally wild and broken weather, of the kind which gives heavy local rainfall, with squalls, or violent cold thunderstorms, but not widespread or destructive gales.

In London the changes above described were well shown by a steady fall of the barometer from the 21st inst., which amounted to an inch at 3.45 P.M. on the 24th. As a heavy squall came on then, the barometer jumped up suddenly two-hundredths of an inch, as is often the case in squalls, and then fell slowly in about a quarter of an hour to its former level, where it remained stationary till about 9 P.M., after which it rose steadily. The squall, which lasted about twenty minutes, was followed by very threatening-looking weather, during which the wind perhaps backed a little to west-north-west, but at 4.40 P.M. it shifted to north-north-east and became strong, with heavy snow, till 5.20, when the weather moderated, the whole being evidently due to the complicated action of one of the secondary depressions before mentioned.

Materials are still wanting for tracing the connection between the squall in London at 3.45 P.M., and that at Ventnor at the same hour, but squalls often do occur simultaneously at distant places in connection with the trough of great non-cyclonic barometric depressions. The question of any such relation has not yet been worked out, and its solution presents great difficulties.

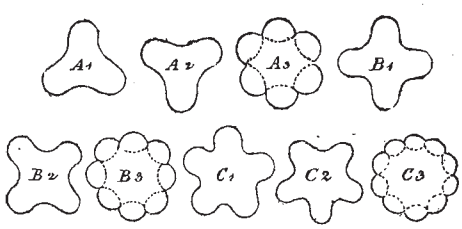
On the whole, then, the squall in which the *Eurydice* was lost, though of a common type, was somewhat exceptional in suddenness and violence.

RALPH ABERCROMBY

21, Chapel Street, S.W., April 3

Leidenfrost's Phenomenon

A FEW days ago I was examining the "rosette" formed by a spheroid of water in a hot platinum capsule, and noticed that the outline was not a continuous curve, as is generally represented in books, but was "beaded" with re-entering angles as shown by the continuous lines in figures A_3, B_3, C_3, while the curve of



each bead could be distinctly traced within the drop, forming a "fluted" outline, shown by the dotted lines in the same figures. It was at once manifest that both the "beaded" and "fluted" figures were produced by the superposition of the retinal images of the drop in two extreme conditions of vibration; that, in the case represented by A_3, the drop was really vibrating like a bell which is sounding its first harmonic above its fundamental note, and therefore possesses six ventral segments, the extreme forms assumed being represented by A_1 and A_2 respectively, and that B_3 and C_3 represent the appearance of the drop when vibrating like a bell which is sounding its second and third harmonic respectively. To verify this a spheroid of about five-eighths of an inch in diameter was produced; and as soon as the beaded decagon, C_3, was steadily maintained, the room was darkened, and the spheroid illuminated by sparks from Holtz's machine. Immediately the curvilinear pentagons C_1 and C_2 were apparent, and frequently the vibrations continued perfectly steady for several seconds. When the drop had diminished in size the mode of vibration changed, and the crosses represented by B_1 and B_2 appeared when the sparks passed; on opening the shutters the beaded octagon B_3 appeared almost perfectly steady in the capsule. The figures A_1, A_2, and A_3 were obtained in the same manner, and with a larger spheroid twelve and sixteen beads were obtained, presenting respectively curvilinear hexagons and octagons when illuminated by the sparks. In one case a small spheroid presented a very large number of beads in its outline; but on examining it with sparks it was found to be produced by the crosses B_1 and B_2 rotating very rapidly about a vertical axis. Two or three particles of carbon introduced into a spheroid remained for a long time close to the surface of one "ventral segment," like lycopodium powder on a Chladni's plate, and when they escaped from it were ensnared by the next segment. The figures observed when the spheroids were illuminated by sparks were fully as exorbitant as those shown at A_1, A_2, B_1, B_2, C_1, and C_2.

If the spheroidal form be due to the combined action of gravity and surface tension, it is obviously to the latter force that we must look for the production of vibrations when, by any accident, the spheroid is disturbed. The amount of steam produced from the under-side of any "ventral segment" will, of course, be greater the greater the surface exposed; and when this is a fresh surface, will increase as the surface becomes heated by exposure. Hence the amount of steam escaping from beneath a "ventral segment" will be greater as it is contracting towards, than when it is moving from, the centre of the spheroid, thus supplying, on the whole, during each vibration an impulse in the direction of motion. It seems unnecessary to look farther for a supply of energy.

WM. GARNETT

Cavendish Laboratory, Cambridge, March 15

Trajectories of Shot

HAVING observed a letter in NATURE, vol. xvii. p. 401, in which extracts from a paper of mine are commented upon by the Rev. F. Bashforth, I trust you will let me make a few remarks by way of explanation.

In the paper referred to I was trying to weigh against one another the merits of different methods of finding the trajectories of shot, the calculations being, of course, based upon Mr. Bashforth's tables; and the method which I liked the best did not contain the equation (a), which is the text of Mr. Bashforth's letter. Now without doubt the method I preferred had faults of its own, but it was a sort of argument in its favour if I could show that the other methods were not faultless, and in particular if I could show that the equation (a), which is the key of those other methods, had no merits of severe accuracy to set off against certain defects which I thought it might fairly be charged with.

The objections I had to the equation (a) are partly set forth in the first extract quoted by Mr. Bashforth; but one great objection to it is the tediousness of its application in practice. Mr. Bashforth appears to be greatly offended with my description of the way the equation is used, viz., that it is a process of guessing. But he cannot pretend that he has solved the equation according to any strict method; he has only guessed at a solution which falls in more or less with his tables. It seems to me he is here quarrelling about a mere name, because the process he describes and indeed illustrates is practically the process I describe, and it is idle on his part to give me the information contained in his letter, because I am very well aware that the second guess gives a better result than the first. But as regards the amount of accuracy belonging to the equation, I must still hold by the substance and tendency of my remarks on that subject, except in my unfortunate use of the epithet "dangerous," which I admit was extreme. I frankly confess that the force of the argument derived from discussing the values of $\frac{dk}{dv}$ is materially weakened when those values are numerically exhibited and compared with the tables. At the same time, when taken in connection with the peculiar way the equation is used, the numbers,

such as I make them roughly, do not convince me that the argument is without force. My chief criticism on the equation has two branches :—1. Mr. Bashforth has nowhere proved that he is entitled to use the k belonging to the mean velocity over the arc. 2. Granting that he may use that k, we have then to consider whether he has got v_β and k to accord. For my part, I do not feel the degree of certainty which Mr. Bashforth expresses about this, especially if the work is carried over a considerable arc. I will grant that his result comes near the truth, but assuredly he cannot be said to have determined v_β *accurately*, as he affirms.

I cannot help thinking that there is no real difference between Mr. Bashforth and myself, for all that I have said against the equation (a) can be said in another form against the method that I prefer, and I willingly indorse the statement in the last paragraph but one of his letter. I may be allowed to add that all methods hitherto proposed of calculating shot ranges seem to me too difficult for common use, and I believe what would really be a boon to the artilleryman is a book of trajectories drawn to scale. This might be accomplished very well by Mr. Bashforth's tables and methods in the hands of some one competent to use them, the simpler methods, as I think them, introduced by me, being also of some service. I trust this will be done when the resistance to shot moving with low velocities has been ascertained, as I hear it is to be, by a series of experiments under Mr. Bashforth's superintendence.

Allow me in conclusion to express my regret that I should seem to have been reviewing in a hostile spirit any part of the work done by Mr. Bashforth at Woolwich. I will only assure him that nothing could have been further from my thoughts than to do so. W. D. NIVEN

Trinity College, Cambridge, March 30

The Daylight Meteor of March 25

A CORRESPONDENT in NATURE described the falling of a daylight meteor on Monday, March 25. I have received information respecting this meteor from five persons who witnessed its fall.

Mr. McIntyre, who saw it from near Dunston-on-Tyne; Mr. Wood, banker, who saw it whilst leaving his residence at Benton, near Newcastle-on-Tyne; Mrs. Hopper, from Gosforth, one mile north of Newcastle; Mrs. Lupton, who saw it from a railway carriage at Brampton, near Carlisle; and Mr. W. Clarke, of Newburn, who saw it at Wallbottle, four miles west of Newcastle. All these observers agree in the following particulars :—1. That the meteor was visible at 10.20. 2. That it was very luminous with a white light slightly coloured. 3. That it fell at a slight inclination from E. to N., and reached the horizon at or near the north point. 4. That the weather was clear and the sun shone brightly at the time the meteor was visible. T. P. BARKAS

26, Archbold Terrace, Newcastle-on-Tyne

Meteor

ON the night of Tuesday, April 2, at about 7.55 o'clock, I was standing with two companions, facing the north, when we were surprised to observe the ground before us suddenly lighted up, and our three shadows sharply defined upon it. One of my friends exclaimed, "Why, there's the moon come out!" We turned round and beheld a wonderfully brilliant meteor descending almost perpendicularly from about 5° east of Betelgeux, in Orion, towards the most eastern of the three stars in the belt. Its course was slightly zig-zag, its colour yellow or orange, its apparent size about half the diameter of the full moon. It vanished noiselessly before reaching the belt, and left no visible remains. When we first saw it there appeared be a short trail of light behind it. About three minutes after its disappearance a rumbling sound was heard like distant thunder, from the same direction. Whether this was connected with the meteor I cannot tell. If so it would indicate a distance of about forty miles, and we ought to hear of this meteor from the neighbourhood of Warwick. F. T. MOTT

Birstal Hill, Leicester

[The same meteor was seen by several *Times* correspondents. It made its appearance in Ursa Major, and after remaining stationary for a second or two between Orion's Belt and Sirius, fell at a comparatively slow rate and in a direct line to the horizon. It was pear-like in shape, seemed three or four times larger than Jupiter, and was intensely bright. Its colour changed from a silvery white to a pale red as it approached the horizon, where it disappeared behind a cloud, leaving a long track of light behind it.]

To Entomologists

As I have undertaken the section "Arthropoda" for the "*Jahresbericht für Anatomie und Physiologie*, of Hoffmann and Schwalbe," and find some difficulty in obtaining English scientific journals (specially the entomological ones) here in Naples, will you permit me through your columns to request such of your readers as may have published papers on the *anatomy*, *ontogeny*, and *phylogeny*, of the *Hexapoda*, *Myriapoda*, *Arachnoidea*, *Protracheata*, *Poecilopoda*, and *Crustacea* in 1877, or intend to do so in 1878 and the following years, to be kind enough to forward me a copy of them, or at least to inform me of the fact? PAUL MAYER

Naples, Stazione Zoologica, March 31

GEOGRAPHICAL NOTES

ROYAL GEOGRAPHICAL SOCIETY MEDALS.—The Founder's Medal for 1878, of the Royal Geographical Society, has been awarded to Baron F. von Richthofen for his extensive travels and scientific explorations in China; also for his great work now in course of publication, in which the materials accumulated during his long journeys are elaborated with remarkable lucidity and completeness. The Patron's Medal has been given to Capt. Henry Trotter, R.E., for his services to geography, in having conducted the survey operations of the late Mission to Eastern Turkistan, under Sir Douglas Forsyth, which resulted in the connection of the Trigonometrical Survey of India with the Russian Surveys from Siberia, and for having further greatly improved the map of Central Asia. Mr. Stanley, being already a medallist, is disqualified from receiving a similar honour, but he has been elected an honorary corresponding member, and is to receive the thanks of the Council for his discoveries.

AFRICA.—With a view to facilitating the progress of the London Missionary Society's contemplated expedition from the East Coast of Africa to Lake Tanganyika, the Rev. Roger Price, who had had long experience of roads and waggons in South Africa, was despatched to Zanzibar in 1876, to make investigations respecting a new route and new mode of travelling into the interior. He made the experiment of using bullocks and waggons in the place of *pagazi*, and with so much success that it was resolved that the expedition should adopt that mode of conveyance for themselves and their goods, and a flourishing account of the new scheme was given before the Royal Geographical Society on February 26, 1877. Before the expedition arrived at Zanzibar in the summer of last year, Mr. Mackay, an agent of the Church Missionary Society, was reported to have cleared a road nearly, if not quite, as far as Mpwapwa, and it was supposed that the expedition would reach the Lake with great ease. Their hopes, however, have been grievously disappointed. The road has turned out to be no road at all, and most of the oxen have died from the effects of the climate. Mr. Price returned to England some little time back, convinced, we believe, of the present impracticability of his bullock-waggon scheme, and sad to relate, it has been found necessary to revert to the old *pagazi* system, the curse of African travel. By latest accounts the expedition had formed a camp at Kirasa, in Usugara, on the edge of the high plateau, and about forty miles east of Mpwapwa, and there they intend to remain till after the rainy season.—Lieut. J. B. Wathier has been appointed to join the Belgian expedition at Zanzibar, which recently lost two of its members, MM. Crespel and Maes. He has visited Dr. Nachtigall at Berlin, to obtain the advice of the experienced explorer, and left Brindisi for Zanzibar on the 5th inst. Dr. Nachtigall himself, as leader of the German expedition, is to start from St. Paul de Loanda, and it is hoped that the two expeditions may meet in the centre of Africa.